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Running title:
WTC-related exposures among Pregnant Women

Keywords:
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Abbreviations:
WTC – World Trade Center. PAH - polycyclic aromatic hydrocarbons. PCB - polychlorinated biphenyls. PCDD – polychlorinated dibenzodioxin. PCDF─ polychlorinated dibenzofuran. OCDD – octachlorodibenzodioxin. PBDE-polybrominated diphenylether. 9/11 – 9/11/2001. EPA - Environmental Protection Agency. DNA – deoxyribonucleic acid. PM – particulate matter. EI – exposure index. GIS ─ geographic information system. LD – limit of detection. HRGC/ID-HRMS- high-resolution gas chromatography/isotope-dilution high-resolution mass spectrometry . SPE - solid phase extraction. RAMS - Regional Atmospheric Modeling System. HYPACT - Hybrid Particle and Concentration Transport. MENTOR- Modeling ENvironment for Total Risk. CDC- Centers for Disease Control and Prevention. OC- organochlorine. NHANES─ National Health and Examination Study.

OUTLINE:

ABSTRACT

We have characterized environmental exposures among 187 women who were pregnant and were at or near the World Trade Center (WTC) on or soon after, September 11, 2001 (9/11), and who are enrolled in a prospective cohort study of health effects. Exposures were assessed by estimating time spent in 5 zones around the WTC and by developing an exposure index (EI) based on plume reconstruction modeling. The daily reconstructed dust levels were correlated with PM2.5 ($r=0.68$) or PM10 ($r= 0.73$-0.93) levels reported from 9/26-10/8/2001 at 4 of 6 sites near the WTC whose data we examined. Biomarkers were measured in a subset. Most (71%) of these women were located within eight blocks of the WTC at 9 a.m. on 9/11, and 12 women were in one of the two WTC towers. Daily EIs were determined to be highest immediately after 9/11 and became much lower but remained highly variable over the next 4 weeks. The weekly summary EI was associated strongly with women's perception of air quality from week-2 to week-4 after the collapse ($p<0.0001$). The highest levels of polycyclic aromatic hydrocarbons –deoxyribonucleic acid (PAH-DNA) adducts were seen among women whose blood was collected sooner after 9/11, but levels showed no significant associations with EI or other potential WTC exposure sources. Lead (Pb) and cobalt (Co) in urine were weakly correlated with ΣEI, but not among samples collected closest to 9/11. Plasma OC levels were low. Median PCB (sum of PCBs 118, 138, 153, 180) was 84 ng/g lipid and had a non-significant positive association with ΣEI ($p>0.05$). 1234678-Heptachlorodibenzodioxin levels (median 30 pg/g lipid) were similar to those levels reported in WTC-exposed firefighters but were not associated with EI. This report indicates intense bystander exposure after the WTC collapse and provides information about nonoccupational exposures among a vulnerable population of pregnant women.